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D0879_MATH_I_PP

MATHEMATICS (PART – I)

BOARD'S QUESTION PAPER (MARCH 2024)

(With Full Solution and Marking Scheme)

Time : 2 Hours] **[Total Marks : 40**

Note : *(i) All questions are compulsory.*

*(ii) Use of a calculator is **not** allowed.*

(iii) The numbers to the right of the questions indicate full marks.

(iv) In case of MCQs [Q. No. 1(A)], only the first attempt will be evaluated and will be given credit.

Q. 1. (A) Choose the correct alternative from given : 4

(i) If 3 is one of the roots of the quadratic equation $kx^2 - 7x + 12 = 0$, then $k =$ .....

(A) 1 (B) -1 (C) 3 (D) -3

(ii) To draw the graph of $x + 2y = 4$, find x when $y = 1$.

(A) 1 (B) 2 (C) -2 (D) 6

(iii) For an A.P., if $t_7 = 4$, $d = -4$, then $a =$ .....

(A) 6 (B) 7 (C) 20 (D) 28

(iv) In the format of GSTIN, there are ..... alphanumerals.

(A) 9 (B) 10 (C) 15 (D) 16

Q. 1. (B) Solve the following subquestions : 4

(i) If $17x + 15y = 11$ and $15x + 17y = 21$, then find the value of $x - y$.

(ii) Find first term of the sequence $t_n = 3n - 2$.

(iii) The face value of a share is ₹ 100 and market value is ₹ 150. If the rate of brokerage is 2%, find the brokerage paid on one share.

(iv) Two-digit numbers are formed using digits 2, 3 and 5 without repeating a digit. Write the sample space.

Q. 2. (A) Complete the following activities and rewrite them : *(Any two)* 4

(i) If (0, 2) is the solution of $2x + 3y = k$, then complete the following activity to find the value of k :

Activity :

$(0, 2)$ is the solution of the equation $2x+3y=k$.

Put $x=\square$ and $y=\square$ in the given equation.

$\therefore 2\times\square+3\times2=k$

$\therefore 0+6=k$

$\therefore k=\square$

(ii) If 2 and 5 are the roots of the quadratic equation, then complete the following activity to form the quadratic equation :

Activity :

Let $\alpha=2$ and $\beta=5$ be the roots of the quadratic equation.

Then the quadratic equation is,

$x^2-(\alpha+\beta)x+\alpha\beta=0$

$\therefore x^2-\left(2+\square\right)x+\square\times5=0$

$\therefore x^2-\square x+\square=0$

(iii) Two coins are tossed simultaneously. Complete the following activity to write the sample space and the given events A and B in the set form :

Event A : To get at least one head.

Event B : To get no head.

Activity :

Two coins are tossed simultaneously.

$\therefore$ sample space is

$S=\{\square, HT, TH, \square\}$

Event A : To get at least one head.

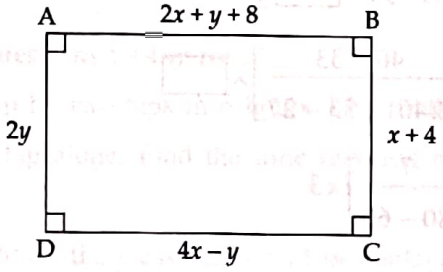
$\therefore A=\{\square, HT, TH\}$

Event B : To get no head.

$\therefore B=\{\square\}$

Q. 2. (B) Solve the following subquestions : *(Any four)* **8**

(i) $\square ABCD$ is a rectangle. Write two simultaneous equations in the form of $ax+by=c$, using information given in the diagram :



(ii) Solve the following quadratic equation using factorisation method :

$x^2+x-20=0$.

(iii) Find the 19th term of the following A.P. :

7, 13, 19, 25, ...

(iv) A card is drawn from a well shuffled pack of 52 playing cards. Find the probability that the card drawn is a face card.

(v) The following table shows the classification of number of workers and number of hours they work in software company. Prepare less than upper limit type cumulative frequency distribution table :

Daily number of hours	Number of workers
8–10	150
10–12	500
12–14	300
14–16	50

Q. 3. (A) Complete the following activity and rewrite it : ***(Any one)*** 3

(i) The following frequency distribution table shows the classification of the number of vehicles and the volume of petrol filled in them. Complete the following activity, to find the mode of the volume of petrol filled :

Class (Petrol filled in litres)	Frequency (Number of vehicles)
0.5–3.5	33
3.5–6.5	40
6.5–9.5	27
9.5–12.5	18
12.5–15.5	12

Activity :

From the given table,

Modal class = $\square$

Mode = $\square + \left[\frac{f_1 - f_0}{2f_1 - f_0 - \square}\right] \times h$

$\therefore$ mode = $3.5 + \left[\frac{40 - 33}{2(40) - 33 - 27}\right] \times \square$

$\therefore$ mode = $3.5 + \left[\frac{7}{80 - 60}\right] \times 3$

$\therefore$ mode = $\square$

$\therefore$ the mode of the volume of petrol filled is $\square$.

(ii) The total value (with GST) of a remote controlled toy car is ₹2360. The rate of GST is 18% on toys. Complete the following activity to find the taxable value for the toy car :

Activity :

Total value for toy car with GST = ₹2360.

The rate of GST = 18%.

Let the taxable value for toy car be ₹x.

$\therefore$ GST $= \frac{18}{100} \times x$

$\therefore$ total value for toy car $= \begin{pmatrix} \text{taxable value} \\ \text{for toy car} \end{pmatrix} + \square$ ... (Formula)

$\therefore 2360 = \square + \frac{\square}{100} \times x$

$\therefore 2360 = \frac{\square}{100} \times x$

$\therefore 2360 \times 100 = 118x$

$\therefore x = \frac{2360 \times 100}{\square}$

$\therefore$ taxable value for toy car is ₹$\square$.

Q. 3. (B) Solve the following subquestions : *(Any two)* 6

(i) Solve the following quadratic equation by formula method :

$3m^2 - m - 10 = 0$.

(ii) Solve the following simultaneous equations using Cramer's rule :

$3x - 4y = 10$, $4x + 3y = 5$.

(iii) 50 shares of face value ₹10 were purchased for market value of ₹25. Company declared 30% dividend on the shares, then find :

(a) sum invested (b) dividend received (c) rate of return.

(iv) One coin and a die are thrown simultaneously. Find the probability of the following events :

Event A : To get a head and a prime number.

Event B : To get a tail and an odd number.

Q. 4. Solve the following subquestions : *(Any two)* 8

(i) A tank can be filled up by two taps in 6 hours. The smaller tap alone takes 5 hours more than the bigger tap alone. Find the time required by each tap to fill the tank separately.

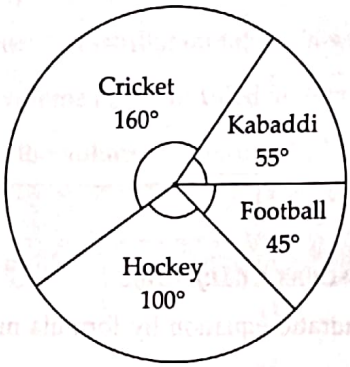
(ii) The following table shows the classification of percentage of marks of students and the number of students. Draw frequency polygon from that table without drawing histogram :

Result (Percentage)	Number of Students
20–40	25
40–60	65
60–80	80
80–100	15

(iii) In a 'Mahila Bachat Gat', Kavita invested ₹20 on the first day of month, ₹40 on the second day and ₹60 on the third day. If she saves like this, then what would be her total savings in the month of February 2020?

Q. 5. Solve the following subquestions : *(Any one)* 3

(i) In the given figure, the pie diagram represents the amount spent on different sports by a school administration in a year. If the money spent on football is ₹9000, answer the following questions :



(a) What is the total amount spent on sports?

(b) What is the amount spent on cricket?

(ii) Draw the graph of the equation $x+y=4$ and answer the following questions.

(a) Which type of triangle is formed by the line with X and Y-axes based on its sides.

(b) Find the area of that triangle.

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D0679_MATH_II_PP

MATHEMATICS (PART–II)

BOARD'S QUESTION PAPER (MARCH 2024)

(With Full Solution and Marking Scheme)

Time : 2 Hours] **[Total Marks : 40**

Note : *(i) All questions are compulsory.*

*(ii) Use of calculator is **not** allowed.*

(iii) The numbers to the right of the questions indicate full marks.

(iv) In case of MCQs [Q. No. 1(A)], only the first attempt will be evaluated and will be given credit.

(v) Draw the proper figures wherever necessary.

(vi) The marks of construction should be clear. Do not erase them.

(vii) Diagram is essential for writing the proof of the theorem.

Q. 1. (A) Four alternative answers for each of the following subquestions are given. Choose the correct alternative and write its alphabet : 4

(i) Out of the dates given below which date constitutes a Pythagorean triplet?

(A) 15/8/17 (B) 16/8/16 (C) 3/5/17 (D) 4/9/15

(ii) $\sin\theta \times \text{cosec}\,\theta = ?$

(A) 1 (B) 0 (C) $\frac{1}{2}$ (D) $\sqrt{2}$

(iii) Slope of X-axis is .....

(A) 1 (B) -1 (C) 0 (D) Cannot be determined

(iv) A circle having radius 3 cm, then the length of its largest chord is .....

(A) 1.5 cm (B) 3 cm (C) 6 cm (D) 9 cm

Q. 1. (B) Solve the following subquestions : 4

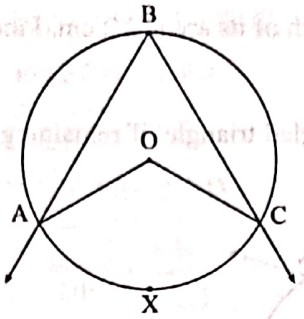
(i) If $\triangle ABC \sim \triangle PQR$ and AB : PQ = 2 : 3, then find the value of $\frac{A(\triangle ABC)}{A(\triangle PQR)}$.

(ii) Two circles of radii 5 cm and 3 cm touch each other externally. Find the distance between their centres.

(iii) Find the side of a square whose diagonal is $10\sqrt{2}$ cm.

(iv) Angle made by the line with the positive direction of X-axis is 45°. Find the slope of that line.

Q. 2. (A) Complete *any two* activities and rewrite them : **4**

(i) 

In the adjoining figure, $\angle ABC$ is inscribed in arc ABC.

If $\angle ABC = 60°$, find $m\angle AOC$.

Activity :

$\angle ABC = \frac{1}{2} m(\text{arc AXC})$ ... $\square$

$\therefore 60° = \frac{1}{2} m(\text{arc AXC})$

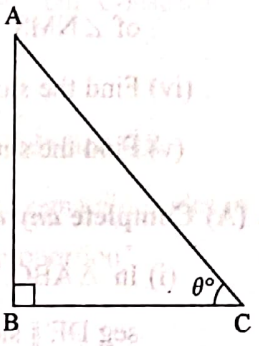
$\square = m(\text{arc AXC})$

But $m\angle AOC =$ $\boxed{m(\text{arc .....})}$ ... (Property of central angle)

$\therefore m\angle AOC = \square$

(ii) Find the value of $\sin^2\theta + \cos^2\theta$.

Activity :



In ΔABC, $\angle ABC = 90°$, $\angle C = \theta°$.

$AB^2 + BC^2 = \square$ ... (Pythagoras theorem)

Dividing both sides by AC^2,

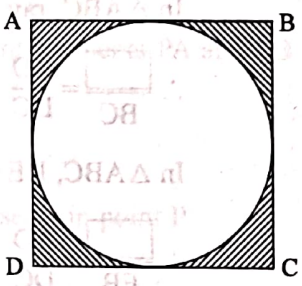
$\frac{AB^2}{AC^2} + \frac{BC^2}{AC^2} = \frac{AC^2}{AC^2}$

$\therefore \left(\frac{AB}{AC}\right)^2 + \left(\frac{BC}{AC}\right)^2 = 1$

But $\frac{AB}{AC} = \square$ and $\frac{BC}{AC} = \square$

$\therefore \sin^2\theta + \cos^2\theta = \square$

(iii) In the given figure, $\square ABCD$ is a square and a circle is inscribed in it. All sides of a square touch the circle.



If AB = 14 cm, find the area of shaded region.

Activity :

Area of square $= \left(\square\right)^2$ ... (Formula)

$= 14^2$

$= \square$ cm^2

Area of circle $= \square$ ... (Formula)

$= \frac{22}{7} \times 7 \times 7$

$= 154$ cm^2

$\begin{pmatrix}\text{Area of shaded}\\ \text{portion}\end{pmatrix} = \begin{pmatrix}\text{Area of}\\ \text{square}\end{pmatrix} - \begin{pmatrix}\text{Area of}\\ \text{circle}\end{pmatrix}$

$= 196 - 154$

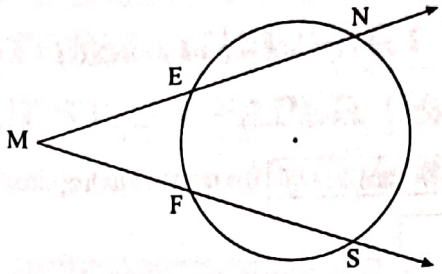
$= \square$ cm^2

Q. 2. (B) Solve *any four* of the following subquestions : 8

(i) Radius of a sector of a circle is 3.5 cm and length of its arc is 2.2 cm. Find the area of the sector.

(ii) Find the length of the hypotenuse of a right angled triangle, if remaining sides are 9 cm and 12 cm.

(iii)



In the above figure, $m(\text{arc NS}) = 125°$, $m(\text{arc EF}) = 37°$. Find the measure of $\angle NMS$.

(iv) Find the slope of the line passing through the points A(2, 3), B(4, 7).

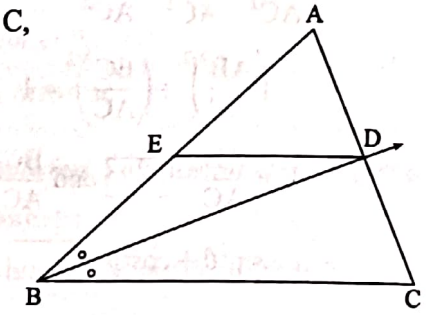
(v) Find the surface area of a sphere of radius 7 cm.

Q. 3. (A) Complete *any one* activity of the following and rewrite it : 3

(i) In $\triangle ABC$, ray BD bisects $\angle ABC$, $A-D-C$,

seg DE $\parallel$ side BC, $A-E-B$,

then for showing $\frac{AB}{AC} = \frac{AE}{EB}$, complete the following activity :



Proof :

In $\triangle ABC$, ray BD bisects $\angle B$.

$\therefore \frac{\square}{BC} = \frac{AD}{DC}$ ... (1) $\left(\square\right)$

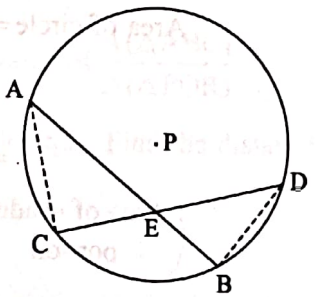
In $\triangle ABC$, DE $\parallel$ BC.

$\therefore \frac{\square}{EB} = \frac{AD}{DC}$ ... (2) $\left(\square\right)$

$\therefore \frac{AB}{\square} = \frac{\square}{EB}$ ... [From (1) and (2)]

(ii) **Given :**

Chords AB and CD of a circle with centre P intersect at point E.



To prove : $AE \times EB = CE \times ED$.

Construction :

Draw seg AC and seg BD.

Fill in the blanks and complete the proof.

Proof :

In $\triangle CAE$ and $\triangle BDE$,

$\angle AEC \cong \angle DEB$ ... $\square$

$\square \cong \angle BDE$ ... (Angles inscribed in the same arc)

$\therefore \triangle CAE \sim \triangle BDE$ ... $\square$

$\therefore \frac{\square}{DE} = \frac{CE}{\square}$ ... $\square$

$\therefore AE \times EB = CE \times ED.$

Q. 3. (B) Solve *any two* of the following subquestions : 6

(i) Determine whether the points are collinear or not :

A(1, −3), B(2, −5), C(−4, 7)

(ii) $\triangle ABC \sim \triangle LMN$. In $\triangle ABC$, AB = 5.5 cm, BC = 6 cm, CA = 4.5 cm. Construct $\triangle ABC$ and $\triangle LMN$ such that $\frac{BC}{MN} = \frac{5}{4}$.

(iii) Seg PM is a median of $\triangle PQR$, PM = 9 and $PQ^2 + PR^2 = 290$, then find QR.

(iv) Prove that, 'If a line parallel to a side of a triangle intersects the remaining sides in two distinct points, then the line divides the side in the same proportion'.

Q. 4. Solve *any two* of the following subquestions : 8

(i) $\frac{1}{\sin^2\theta} - \frac{1}{\cos^2\theta} - \frac{1}{\tan^2\theta} - \frac{1}{\cot^2\theta} - \frac{1}{\sec^2\theta} - \frac{1}{\text{cosec}^2\theta} = -3$, then find the value of θ.

(ii) A cylinder of radius 12 cm contains water up to the height 20 cm. A spherical iron ball is dropped into the cylinder and thus water level raised by 6.75 cm. What is the radius of iron ball?

(iii) Draw a circle with centre O having radius 3 cm. Draw tangent segments PA and PB through the point P outside the circle such that $\angle APB = 70°$.

Q. 5. Solve *any one* of the following subquestions : 3

(i) □ABCD is trapezium, AB ∥ CD. Diagonals of trapezium intersects in point P.

Write the answers of the following questions :

(a) Draw the figure using the given information.

(b) Write any one pair of alternate angles and opposite angles.

(c) Write the names of similar triangles with test of similarity.

(ii) AB is a chord of a circle with centre O. AOC is the diameter of the circle. AT is a tangent at A.

Write answers to the following questions :

(a) Draw the figure using given information.

(b) Find the measures of $\angle CAT$ and $\angle ABC$ with reasons.

(c) Whether $\angle CAT$ and $\angle ABC$ are congruent? Justify your answer.

प्र. क्र. Q. No. 1 (A)

(i) (A)

(ii) (B)

(iii) (D)

(iv) (C) *(1 mark each)*

Note : Answers with solutions are expected.

1 (B) (i) Ans.

$17x+15y=11$ ... (1)

$15x+17y=21$ ... (2)

Subtracting equation (2) from equation (1),

$17x+15y=11$ ... (1)

$-\ 15x+17y=21$ ... (2)

$2x-2y=-10$ *(½ mark)*

Dividing both the sides by 2,

$x-y=-5$ *(½ mark)*

The value of $x-y$ is -5.

(ii) Ans.

$t_n=3n-2$

Substituting $n=1$,

$t_1=3\times1-2$ *(½ mark)*

$=3-2=1$ *(½ mark)*

The first term is 1.

प्र. क्र.
Q. No. 1 (B)

(iii) Ans.

The rate of brokerage is 2%.

The market value of the share is ₹150.

The brokerage $= ₹150 \times \frac{2}{100}$ (½ mark)

$= ₹3$ (½ mark)

The brokerage paid on one share is ₹3.

(iv) Ans.

Two-digit numbers are formed using the digits 2, 3 and 5 without repeating a digit. The sample space is

S = {23, 25, 32, 35, 52, 53}. (1 mark)

प्र. क्र.
Q. No. 2 (A)

Note : Any two out of three activities are to be attempted. Here, we have completed all the three activities for the guidance of the students.

(i) Activity :

(0, 2) is the solution of the equation $2x+3y=k$.

Put $x=$ 0 and $y=$ 2 in the given equation. *(½ + ½ mark)*

$\therefore 2\times 0+3\times 2=k$ *(½ mark)*

$\therefore 0+6=k$

$\therefore k=$ 6 *(½ mark)*

(ii) Activity :

Let $\alpha=2$ and $\beta=5$ be the roots of the quadratic equation.

Then the quadratic equation is,

$x^2-(\alpha+\beta)x+\alpha\beta=0$

$\therefore x^2-(2+5)x+2\times 5=0$ *(½ + ½ mark)*

$\therefore x^2-7x+10=0$ *(½ + ½ mark)*

(iii) Activity :

Two coins are tossed simultaneously.

$\therefore$ sample space is

$S=\{HH, HT, TH, TT\}$ *(½ + ½ mark)*

Event A : To get at least one head.

$\therefore A=\{HH, HT, TH\}$ *(½ mark)*

Event B : To get no head.

$\therefore B=\{TT\}$ *(½ mark)*

प्र. क्र.
Q. No. 2 (B)

Note : Any four out of five questions are to be solved. Answers with solutions are expected.

(i) Solution :

□ABCD is a rectangle.

∴ DC = AB ... (Opposite sides of a rectangle)

∴ $4x - y = 2x + y + 8$ *(½ mark)*

∴ $4x - y - 2x - y = 8$

∴ $2x - 2y = 8$

∴ $x - y = 4$ ... (Dividing both the sides by 2) ... (1) *(½ mark)*

Also, BC = AD ... (Opposite sides of a rectangle)

∴ $x + 4 = 2y$ *(½ mark)*

∴ $x - 2y = -4$ ... (2) *(½ mark)*

Ans. The equations are $x - y = 4$ and $x - 2y = -4$.

(ii) Solution :

$x^2 + x - 20 = 0$

∴ $x^2 + 5x - 4x - 20 = 0$ *(½ mark)*

∴ $x(x + 5) - 4(x + 5) = 0$

∴ $(x + 5)(x - 4) = 0$ *(½ mark)*

∴ $x + 5 = 0$ or $x - 4 = 0$ *(½ mark)*

∴ $x = -5$ or $x = 4$ *(½ mark)*

Ans. $-5, 4$ are the roots of the given quadratic equation.

(iii) Solution :

7, 13, 19, 25, ... is an A.P.

Here, $a = t_1 = 7$, $t_2 = 13$, $t_3 = 19$, $t_4 = 25$, ...

$d = t_2 - t_1 = 13 - 7 = 6$.

We have to find 19th term, $t_{19} = ?$ *(½ mark)*

प्र. क्र.
Q. No. 2 (B)

$t_n = a + (n-1)d$ ... (Formula) *(½ mark)*

$\therefore t_{19} = 7 + (19-1) \times 6$ *(½ mark)*

$= 7 + 18 \times 6$

$= 7 + 108$

$\therefore t_{19} = 115$ *(½ mark)*

Ans. The 19th term is 115.

(iv) Solution :

S is the sample space. $\therefore n(S) = 52$. *(½ mark)*

Let event A : A card drawn is a face card.

Total face cards = 12

$\therefore n(A) = 12$ *(½ mark)*

$P(A) = \frac{n(A)}{n(S)}$ ... (Formula) *(½ mark)*

$\therefore P(A) = \frac{12}{52}$

$\therefore P(A) = \frac{3}{13}$ *(½ mark)*

Ans. The probability is $\frac{3}{13}$.

(v) Solution :

Daily number of hours	Number of workers	Cumulative frequency less than upper limit type	
8-10	150	150	*(½ mark)*
10-12	500	650	*(½ mark)*
12-14	300	950	*(½ mark)*
14-16	50	1000	*(½ mark)*

प्र. क्र.
Q. No. 3 (A)

Note : Any one out of two activities are to be attempted. Here, we have completed both the activities for the guidance of the students.

(i) Activity :

From the given table,

[the maximum frequency (40) is in the class 3.5 – 6.5.]

Modal class = 3.5 – 6.5 *(½ mark)*

$\text{Mode} = L + \left[\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right] \times h$ *(½ + ½ mark)*

$\therefore \text{mode} = 3.5 + \left[\frac{40 - 33}{2(40) - 33 - 27}\right] \times 3$ *(½ mark)*

$\therefore \text{mode} = 3.5 + \left[\frac{7}{80 - 60}\right] \times 3$

$\therefore \text{mode} = 4.55$ *(½ mark)*

$\therefore$ the mode of the volume of petrol filled is 4.55 litres. *(½ mark)*

(ii) Activity :

Total value for toy car with GST = ₹2360

The rate of GST = 18%.

Let the taxable value for toy car be ₹x.

$\therefore \text{GST} = \frac{18}{100} \times x$

$\therefore$ total value for toy car = (taxable value for toy car) + GST

... (Formula) *(½ mark)*

$\therefore 2360 = x + \frac{18}{100} \times x$ *(½ + ½ mark)*

$\therefore 2360 = \frac{118}{100} \times x$ *(½ mark)*

$\therefore 2360 \times 100 = 118x \quad \therefore x = \frac{2360 \times 100}{118}$ *(½ mark)*

$\therefore$ taxable value for toy car is ₹ 2000. *(½ mark)*

प्र. क्र.
Q. No. 3 (B)

Note : Any two out of four questions are to be solved. Here, we have solved all the four questions for the guidance of the students.

(i) Solution :

$3m^2 - m - 10 = 0$

Comparing with the standard form $ax^2 + bx + c = 0$,

we get, $a = 3,\ b = -1,\ c = -10$. *(½ mark)*

$b^2 - 4ac = (-1)^2 - 4 \times 3 \times (-10)$

$= 1 + 120$

$\therefore b^2 - 4ac = 121$ *(½ mark)*

$m = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ ... (Formula) *(½ mark)*

$\therefore m = \dfrac{-(-1) \pm \sqrt{121}}{2 \times 3}$

$\therefore m = \dfrac{1 \pm 11}{6}$ *(½ mark)*

$\therefore m = \dfrac{1+11}{6}$ or $m = \dfrac{1-11}{6}$ *(½ mark)*

$\therefore m = \dfrac{12}{6}$ or $m = \dfrac{-10}{6}$

$\therefore m = 2$ or $m = \dfrac{-5}{3}$ *(½ mark)*

Ans. $2, \dfrac{-5}{3}$ are the roots of the given quadratic equation.

(ii) Solution :

$3x - 4y = 10$ ... (1) Here, $a_1 = 3,\ b_1 = -4,\ c_1 = 10$

$4x + 3y = 5$ ... (2) $a_2 = 4,\ b_2 = 3,\ c_2 = 5$.

$D = \begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix} = \begin{vmatrix} 3 & -4 \\ 4 & 3 \end{vmatrix} = 3 \times 3 - (-4) \times 4$

$= 9 + 16$

$\therefore D = 25$ *(½ mark)*

प्र. क्र. Q. No. 3 (B)

$D_x = \begin{vmatrix} c_1 & b_1 \\ c_2 & b_2 \end{vmatrix} = \begin{vmatrix} 10 & -4 \\ 5 & 3 \end{vmatrix} = 10 \times 3 - (-4) \times 5$

$= 30 + 20$

$\therefore D_x = 50$ *(½ mark)*

$D_y = \begin{vmatrix} a_1 & c_1 \\ a_2 & c_2 \end{vmatrix} = \begin{vmatrix} 3 & 10 \\ 4 & 5 \end{vmatrix} = 3 \times 5 - 10 \times 4$

$= 15 - 40$

$\therefore D_y = -25$ *(½ mark)*

Using Cramer's rule,

$x = \frac{D_x}{D}; y = \frac{D_y}{D}$ *(½ mark)*

$\therefore x = \frac{50}{25}; y = \frac{-25}{25}$

$\therefore x = 2; y = -1$ *(½ + ½ mark)*

Ans. $(x, y) = (2, -1)$ is the solution.

(iii) Solution :

FV = ₹10; MV = ₹25

Number of shares = 50

(a) Sum invested = MV × Number of shares

= ₹25 × 50

= ₹1250 *(½ mark)*

(b) Dividend per share = 30% of FV

$= \frac{30}{100} \times 10 = ₹3$ *(½ mark)*

Total dividend received on 50 shares = ₹3 × 50 = ₹150 *(½ mark)*

(c) Rate of return $= \frac{\text{Dividend received}}{\text{Sum invested}} \times 100$ *(½ mark)*

$= \frac{150}{1250} \times 100$ *(½ mark)*

$= 12\%$ *(½ mark)*

Ans. (a) Sum invested is ₹1250.

(b) Dividend received is ₹150.

(c) Rate of return is 12%.

प्र. क्र. Q. No. 3 (B)

(iv)

प्र. क्र.
Q. No. 3 (B)

(iv) Solution :

One coin and a die are thrown simultaneously.

∴ sample space is

$S = \{H1, H2, H3, H4, H5, H6, T1, T2, T3, T4, T5, T6\}$ *(½ mark)*

$\therefore n(S) = 12$ *(½ mark)*

Event A : To get a head and a prime number.

$\therefore A = \{H2, H3, H5\}$ *(½ mark)*

$\therefore n(A) = 3$

$P(A) = \frac{n(A)}{n(S)} \quad \therefore P(A) = \frac{3}{12} = \frac{1}{4}$ *(½ mark)*

Event B : To get a tail and an odd number.

$\therefore B = \{T1, T3, T5\}$ *(½ mark)*

$\therefore n(B) = 3$

$P(B) = \frac{n(B)}{n(S)} \quad \therefore P(B) = \frac{3}{12} = \frac{1}{4}$ *(½ mark)*

Ans. The probability of event A is $\frac{1}{4}$ and

the probability of event B is $\frac{1}{4}$.

प्र. क्र.
Q. No. 4

Note : Any two out of three questions are to be solved. Here, we have solved all the three questions for the guidance of the students.

(i) Solution :

Let the bigger tap alone fill the tank in x hours. Then the smaller tap alone fill the tank in $(x+5)$ hours. *(½ mark)*

In one hour, the bigger tap will fill $\frac{1}{x}$ part of the tank and the smaller tap will fill $\frac{1}{x+5}$ part of the tank.

$\therefore$ both the taps together will fill $\left(\frac{1}{x}+\frac{1}{x+5}\right)$ part of the tank. *(½ mark)*

The tank is filled up by two taps in 6 hours.

$\therefore$ both the taps together fill $\frac{1}{6}$ part of the tank in 1 hour.

$\therefore \frac{1}{x}+\frac{1}{x+5}=\frac{1}{6}$ *(½ mark)*

$\therefore \frac{x+5+x}{x(x+5)}=\frac{1}{6} \quad \therefore \frac{2x+5}{x^2+5x}=\frac{1}{6}$

$\therefore 6(2x+5)=x^2+5x$

$\therefore x^2+5x=6(2x+5)$

$\therefore x^2+5x=12x+30$

$\therefore x^2+5x-12x-30=0$

$\therefore x^2-7x-30=0$ *(½ mark)*

$\therefore x^2-10x+3x-30=0$

$\therefore x(x-10)+3(x-10)=0$

$\therefore (x-10)(x+3)=0$ *(½ mark)*

$\therefore x-10=0$ or $x+3=0$

$\therefore x=10$ or $x=-3$ *(½ mark)*

But the time cannot be negative.

$\therefore x=-3$ is unacceptable.

$\therefore x=10$ and $x+5=10+5=15$ *(½ mark)*

Ans. The bigger tap alone fills the tank in 10 hours and the smaller tap alone fills the tank in 15 hours. *(½ mark)*

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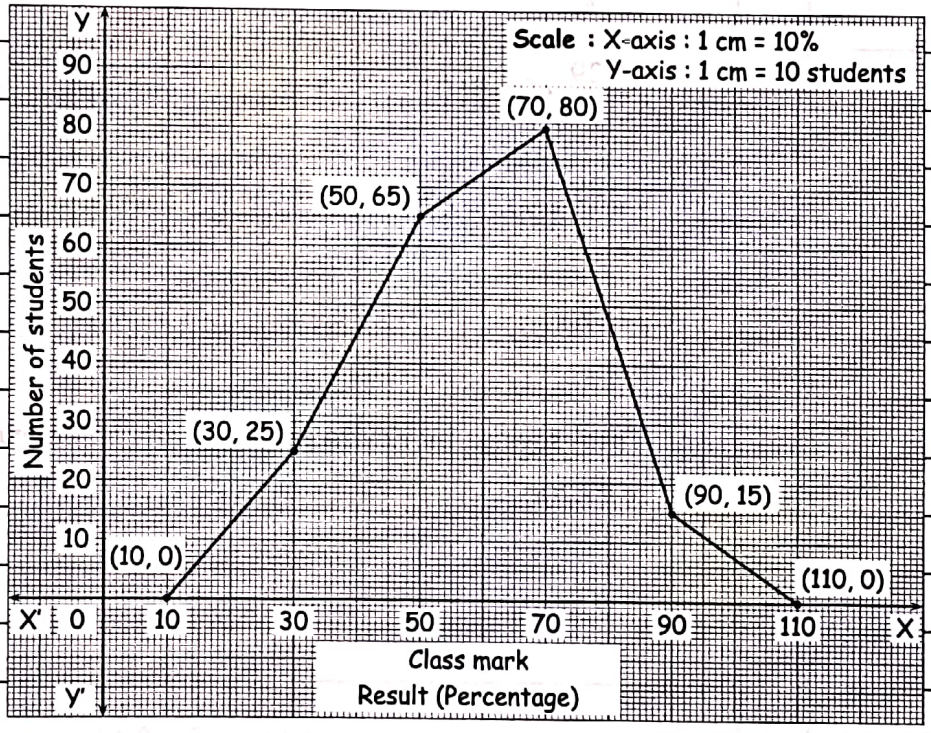
Q. No. 4

(ii) Solution :

To draw the frequency polygon, we take two more classes. The class preceding the first class and the class succeeding the last class, each with frequency zero. The table to draw the frequency polygon is as follows :

Class result (percentage)	Class mark	Frequency (Number of students)	Coordinates of the points
0-20	10	0	(10, 0)
20-40	30	25	(30, 25)
40-60	50	65	(50, 65)
60-80	70	80	(70, 80)
80-100	90	15	(90, 15)
100-120	110	0	(110, 0)



[Scheme of marking : ½ mark for class mark column; ½ mark for coordinates of points column; 2 marks for plotting the point; ½ mark for completing polygon; ½ mark for proper scale.]

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(iii) Solution :

Investment by Kavita on the 1st day of the month is ₹20, on the 2nd day ₹40, on the 3rd day ₹60 and so on. This is a sequence with common difference $d = 20$.

$\therefore$ this is an A.P. *(½ mark)*

Here, $a = 20$, $d = 20$. *(½ mark)*

2020 is a leap year. $\therefore$ in the month of February 2020, there are 29 days.

$\therefore n = 29$ *(½ mark)*

We want to find S_{29}.

$S_n = \frac{n}{2}[2a + (n-1)\,d]$ ... (Formula) *(½ mark)*

$\therefore S_{29} = \frac{29}{2}[2 \times 20 + (29-1) \times 20]$ ... (Substituting the values) *(½ mark)*

$= \frac{29}{2}[40 + 28 \times 20]$

$= \frac{29}{2}[40 + 560]$

$= \frac{29}{2} \times 600 = 29 \times 300$ *(½ mark)*

$\therefore S_{29} = 8700$ *(½ mark)*

Ans. Total savings by Kavita in the month of February 2020 is ₹8700. *(½ mark)*

प्र. क्र.
Q. No. 5

Note : Any one out of two questions are to be solved. Here, we have solved both the questions for the guidance of the students.

(i) Solution :

(a) Let the total amount spent on sports be ₹x.

The total amount spent corresponds to the central angle 360°.

$$\text{The central angle for football} = \frac{\text{Expenditure on football}}{\text{Total expenditure}} \times 360°$$

$$\therefore 45° = \frac{9000}{x} \times 360° \qquad \textit{(½ mark)}$$

$$\therefore x = \frac{9000 \times 360°}{45°} \qquad \textit{(½ mark)}$$

$$\therefore x = 72000$$

The total amount spent on sports is ₹72,000. *(½ mark)*

(b) The central angle for cricket is 160°.

$$\text{The central angle for cricket} = \frac{\text{Expenditure on cricket}}{\text{Total expenditure}} \times 360°$$

$$\therefore 160° = \frac{\text{Expenditure on cricket}}{72000} \times 360° \qquad \textit{(½ mark)}$$

$$\therefore \text{expenditure on cricket} = \frac{72000 \times 160°}{360°} \qquad \textit{(½ mark)}$$

$$= 32000$$

The amount spent on cricket is ₹32,000. *(½ mark)*

Ans. (a) ₹72,000 (b) ₹32,000.

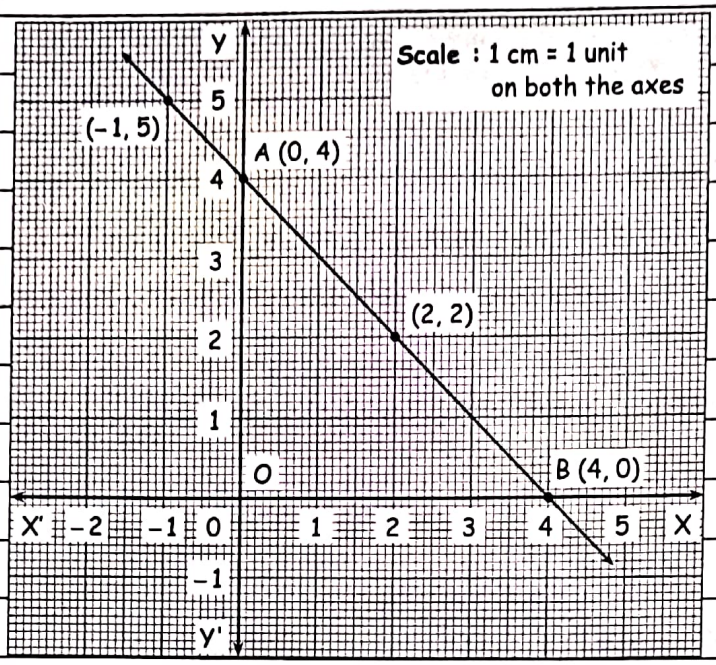
(ii) Solution :

$x + y = 4$

$\therefore y = 4 - x$

x	−1	0	2	4
y	5	4	2	0
(x, y)	(−1, 5)	(0, 4)	(2, 2)	(4, 0)

प्र. क्र.
Q. No. 5



(a) $\triangle AOB$ is formed by the line with the X and Y-axes.

$\triangle AOB$ is an isosceles triangle.

[OA = 4 units, OB = 4 units.]

(b) $A(\triangle AOB) = \frac{1}{2} \times \text{base} \times \text{height}$ ... (Formula)

$= \frac{1}{2} \times OB \times OA$

$= \frac{1}{2} \times 4 \times 4 = 8$ sq units.

Ans. (a) The triangle formed is an isosceles triangle.

(b) The area of the triangle is 8 sq units.

[Scheme of marking : 1 mark for drawing the graph of the equation; 1 mark for writing the type of triangle formed; 1 mark for finding the area of the triangle.]

प्र. क्र. / Q. No. **1 (A)**

(i) (A) *(1 mark)*

(ii) (A) *(1 mark)*

(iii) (C) *(1 mark)*

(iv) (C) *(1 mark)*

1 (B)

Note : Here answers with solution are expected.

(i) Ans.

$\triangle ABC \sim \triangle PQR$ ... (Given)

$\frac{A(\triangle ABC)}{A(\triangle PQR)} = \frac{AB^2}{PQ^2}$

... (Theorem of areas of two similar triangles) *(½ mark)*

$= \left(\frac{AB}{PQ}\right)^2 = \left(\frac{2}{3}\right)^2 = \frac{4}{9}$ *(½ mark)*

The value of $\frac{A(\triangle ABC)}{A(\triangle PQR)}$ is $\frac{4}{9}$

(ii) Ans.

The radius of the first circle $(r_1) = 5$ cm

The radius of the second circle $(r_2) = 3$ cm

By theorem of touching circles, the distance between the centres of two externally touching circles $= r_1 + r_2$ *(½ mark)*

$= 5 + 3$

$= 8$ cm *(½ mark)*

Distance between the centres of two externally touching circles is 8 cm.

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Q. No. 1 (B)

(iii) Ans.

Diagonal of square $= \sqrt{2} \times$ side *(½ mark)*

$\therefore 10\sqrt{2} = \sqrt{2} \times$ side

$\therefore \frac{10\sqrt{2}}{\sqrt{2}} =$ side

$\therefore$ side $= 10$ *(½ mark)*

The side of the square is 10 cm.

(iv) Ans.

Angle made by a line with the positive direction of X-axis $(\theta) = 45°$.

Slope of the line $= \tan\theta = \tan 45°$ *(½ mark)*

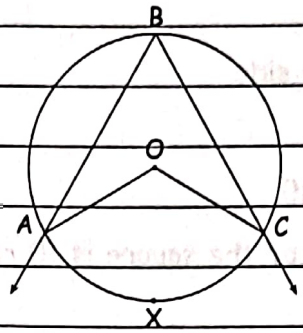
$= \tan 45° = 1$. *(½ mark)*

The slope of the line is 1.

प्र. क्र.
Q. No. 2 (A)

Note : *In this question type, students are required to solve any 2 of 3 activities. However, solutions to all 3 activities are given here, for the guidance of the students.*

(i)



Activity :

$\angle ABC = \frac{1}{2}$ m(arc AXC) ... (Inscribed angle theorem) *(½ mark)*

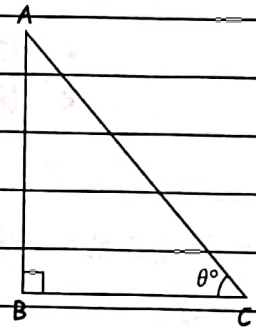
$\therefore 60° = \frac{1}{2}$ m(arc AXC)

$\boxed{120°}$ = m(arc AXC) *(½ mark)*

But m$\angle$AOC = $\boxed{\text{m(arc AXC)}}$ ... (Property of central angle) *(½ mark)*

$\therefore$ m$\angle$AOC = $\boxed{120°}$ *(½ mark)*

(ii) Activity :



In $\triangle ABC$, $\angle ABC = 90°$, $\angle C = \theta°$.

$AB^2 + BC^2 = \boxed{AC^2}$ ... (Pythagoras theorem) *(½ mark)*

Dividing both the sides by AC^2,

$$\frac{AB^2}{AC^2} + \frac{BC^2}{AC^2} = \frac{AC^2}{AC^2}$$

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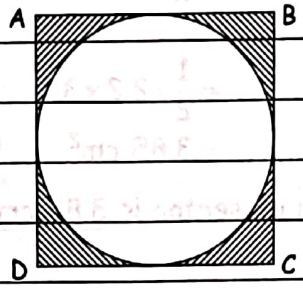
Q. No. 2 (A)

$\therefore \left(\frac{AB}{AC}\right)^2 + \left(\frac{BC}{AC}\right)^2 = 1$

But $\frac{AB}{AC} = \boxed{\sin\theta}$ and $\frac{BC}{AC} = \boxed{\cos\theta}$ *(½ + ½ mark)*

$\therefore \sin^2\theta + \cos^2\theta = \boxed{1}$ *(½ mark)*

(iii) Activity :



Area of square $= \left(\boxed{\text{side}}\right)^2$ ... (Formula) *(½ mark)*

$= 14^2$

$= \boxed{196}$ cm^2 *(½ mark)*

Area of circle $= \boxed{\pi r^2}$ ... (Formula) *(½ mark)*

$= \frac{22}{7} \times 7 \times 7 = 154$ cm^2

$\left(\text{Area of shaded portion}\right) = \left(\text{Area of square}\right) - \left(\text{Area of circle}\right)$

$= 196 - 154$

$= \boxed{42}$ cm^2 *(½ mark)*

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Q. No. **2 (B)**

Note : In this question type, students are required to solve any 4 of 5 subquestions. However, solutions to all 5 subquestions are given here, for the guidance of the students.

(i) **Solution :**

Radius of circle $(r) = 3.5$ cm

Length of arc $(l) = 2.2$ cm

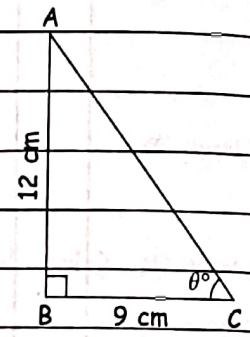
Area of sector $= \frac{1}{2} \times l \times r$ ... (Formula) *(1 mark)*

$= \frac{1}{2} \times 2.2 \times 3.5$

$= 3.85 \text{ cm}^2$ *(1 mark)*

Ans. Area of sector is 3.85 cm^2.

(ii) **Solution :**



Let $\triangle ABC$ be the given right angled triangle. $AB = 12$ cm and $BC = 9$ cm.

In $\triangle ABC$, $\angle ABC = 90°$

∴ by Pythagoras theorem,

$AC^2 = AB^2 + BC^2$ *(½ mark)*

$\therefore AC^2 = 12^2 + 9^2$ *(½ mark)*

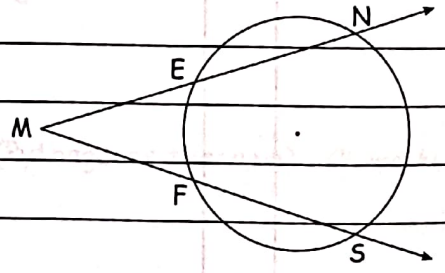
$\therefore AC^2 = 144 + 81$

$\therefore AC^2 = 225$ *(½ mark)*

$\therefore AC = 15$ ... (Taking square roots of both the sides) *(½ mark)*

Ans. Hypotenuse of right angled triangle is 15 cm.

(iii) **Solution :**



The vertex of $\angle NMS$ is in exterior of the given circle and it intercepts arc NS and arc EF.

$\angle NMS = \frac{1}{2}[m(\text{arc NS}) - m(\text{arc EF})]$ *(1 mark)*

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Q. No. 2 (B)

$= \frac{1}{2}[125° - 37°]$ *(½ mark)*

$= \frac{1}{2} \times 88°$

$= 44°$ *(½ mark)*

Ans. The measure of $\angle NMS$ is $44°$.

(iv) Solution :

$A(2, 3) \equiv (x_1, y_1)$

$B(4, 7) \equiv (x_2, y_2)$

Slope of $AB = \frac{y_2 - y_1}{x_2 - x_1}$ ... (Formula) *(½ mark)*

$= \frac{7 - 3}{4 - 2}$ *(½ mark)*

$= \frac{4}{2}$ *(½ mark)*

$= 2$ *(½ mark)*

Ans. Slope of line AB is 2.

(v) Solution :

Radius of sphere $(r) = 7$ cm

Surface area of sphere $= 4\pi r^2$ ... (Formula) *(½ mark)*

$= 4 \times \frac{22}{7} \times 7^2$ *(½ mark)*

$= 4 \times 22 \times 7$ *(½ mark)*

$= 616 \text{ cm}^2$ *(½ mark)*

Ans. Surface area of sphere is 616 cm^2

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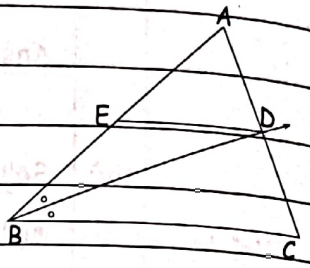
Q. No. 3 (A)

Note : *In this question type, students are required to attempt any 1 of 2 activities. However, solutions to both the activities are given here, for the guidance of the students.*

(i) Proof :

In $\triangle ABC$, ray BD bisects $\angle B$.



$\therefore \frac{AB}{BC} = \frac{AD}{DC}$ ... (1) (By theorem of an angle bisector of a triangle)

(½ + ½ mark)

In $\triangle ABC$, $DE \parallel BC$.

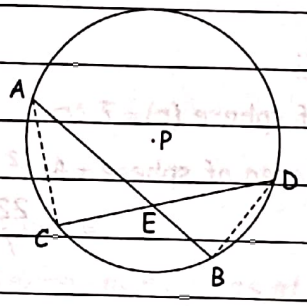
$\therefore \frac{AE}{EB} = \frac{AD}{DC}$ ... (2) (By Basic Proportionality theorem)

(½ + ½ mark)

$\therefore \frac{AB}{BC} = \frac{AE}{EB}$ ... [From (1) and (2)]

(½ + ½ mark)

(ii) Proof :



In $\triangle CAE$ and $\triangle BDE$,

$\angle AEC \cong \angle DEB$ ... Vertically opposite angles (½ mark)

$\angle CAE \cong \angle BDE$ ... (Angles inscribed in the same arc) (½ mark)

$\therefore \triangle CAE \sim \triangle BDE$ ... AA test of similarity (½ mark)

$\therefore \frac{AE}{DE} = \frac{CE}{BE}$ ... Corresponding sides of similar triangles

(½ + ½ + ½ marks)

$\therefore AE \times EB = CE \times ED$.

प्र. क्र.
Q. No. 3 (B)

Note : In this question type, students are required to solve any 2 of 4 subquestions. However, solutions to all 4 subquestions are given here, for the guidance of the students.

(i) Solution :

$A(1, -3), B(2, -5), C(-4, 7)$

Let $A(1, -3) \equiv (x_1, y_1)$, $B(2, -5) \equiv (x_2, y_2)$ and $C(-4, 7) \equiv (x_3, y_3)$

Slope of line $AB = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-5-(-3)}{2-1} = \frac{-5+3}{1} = -2$ *(1 mark)*

Slope of line $BC = \frac{y_3 - y_2}{x_3 - x_2} = \frac{7-(-5)}{-4-2} = \frac{7+5}{-6} = \frac{12}{-6} = -2$ *(1 mark)*

∴ slope of line AB = slope of line BC and B is the common point. *(½ mark)*

Ans. Points A, B and C are collinear. *(½ mark)*

(ii) Solution :

For $\triangle ABC$, the lengths of three sides are known.

∴ $\triangle ABC$ can be constructed.

$\triangle ABC \sim \triangle LMN$

$\therefore \frac{AB}{LM} = \frac{BC}{MN} = \frac{AC}{LN}$ ... (Corresponding sides of similar triangles are in proportion)

$\therefore \frac{5.5}{LM} = \frac{6}{MN} = \frac{4.5}{LN} = \frac{5}{4}$

$\therefore \frac{5.5}{LM} = \frac{5}{4}$	$\frac{6}{MN} = \frac{5}{4}$	$\frac{4.5}{LN} = \frac{5}{4}$
$\therefore LM = \frac{5.5 \times 4}{5}$	$\therefore MN = \frac{6 \times 4}{5}$	$\therefore LN = \frac{4.5 \times 4}{5}$
$\therefore LM = 1.1 \times 4$	$\therefore MN = \frac{24}{5}$	$\therefore LN = \frac{18}{5}$
$\therefore LM = 4.4$ cm	$\therefore MN = 4.8$ cm	$\therefore LN = 3.6$ cm

For $\triangle LMN$, the lengths of three sides are known.

∴ $\triangle LMN$ can be constructed.

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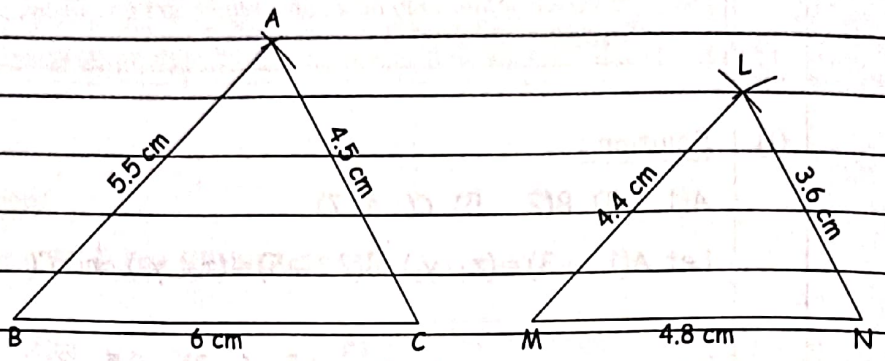
Q. No. 3 (B)

Ans.



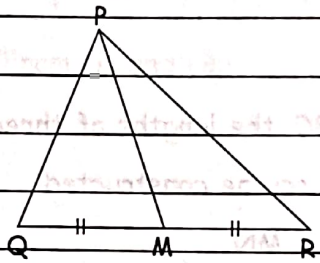
[Marking scheme :

(1) To find the measures of $\triangle LMN$. *(1 mark)*

(2) To construct $\triangle ABC$. *(1 mark)*

(3) To construct $\triangle LMN$. *(1 mark)]*

(iii) Solution :



In $\triangle PQR$,

seg PM is the median

$PQ^2 + PR^2 = 2PM^2 + 2QM^2$ ... (Apollonius theorem) *(½ mark)*

$\therefore 290 = 2 \times 9^2 + 2 \times QM^2$ *(½ mark)*

$\therefore 290 = 162 + 2QM^2$

$\therefore 2QM^2 = 290 - 162$ *(½ mark)*

$\therefore 2QM^2 = 128$

$\therefore QM^2 = 64$

$\therefore QM = \sqrt{64}$

$\therefore QM = 8$ *(½ mark)*

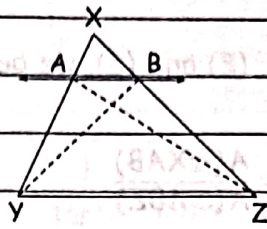
$QR = 2 \times QM$ ... [M is the midpoint of QR] *(½ mark)*

$\therefore QR = 2 \times 8$

$\therefore QR = 16$ units

Ans. $QR = 16$ units. *(½ mark)*

प्र. क्र.
Q. No. 3 (B) (iv)



(½ mark)

Given : In $\triangle XYZ$,

(i) Line AB $\parallel$ side YZ.

(ii) Line AB intersects side XY and side XZ in points A and B respectively such that X – A – Y and X – B – Z. *(½ mark)*

To prove : $\frac{XA}{AY} = \frac{XB}{BZ}$

Construction : Draw seg BY and seg AZ.

Proof : $\triangle XAB$ and $\triangle BAY$ have a common vertex B and their bases XA and AY lie on the same line XY.

$\therefore$ they have equal heights.

$\therefore \frac{A(\triangle XAB)}{A(\triangle BAY)} = \frac{XA}{AY}$ ... (Triangles of equal heights) ... (1) *(½ mark)*

$\triangle XAB$ and $\triangle ABZ$ have a common vertex A and their bases XB and BZ lie on the same line XZ.

$\therefore$ they have equal heights.

$\therefore \frac{A(\triangle XAB)}{A(\triangle ABZ)} = \frac{XB}{BZ}$ ... (Triangles of equal heights) ... (2) *(½ mark)*

$\triangle BAY$ and $\triangle ABZ$ lie between the same two parallel lines AB and YZ.

$\therefore$ they have equal heights, also they have same base AB.

$\therefore A(\triangle BAY) = A(\triangle ABZ)$

... [Triangles with same base and equal heights] ... (3) *(½ mark)*

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Q. No. 3 (B)

∴ from (1), (2) and (3), we get,

$$\frac{A(\triangle XAB)}{A(\triangle BAY)} = \frac{A(\triangle XAB)}{A(\triangle ABZ)} \quad \ldots (4)$$

∴ from (1), (2) and (4), we get,

$$\frac{XA}{AY} = \frac{XB}{BZ}. \quad (\frac{1}{2} \text{ mark})$$

प्र. क्र. Q. No. 4

Note : In this question type, students are required to attempt any 2 of 3 subquestions. However, solutions to all 3 subquestions are given here, for the guidance of the students.

(i) Solution : $\frac{1}{\sin^2\theta} - \frac{1}{\cos^2\theta} - \frac{1}{\tan^2\theta} - \frac{1}{\cot^2\theta} - \frac{1}{\sec^2\theta} - \frac{1}{\operatorname{cosec}^2\theta} = -3$

$\therefore \operatorname{cosec}^2\theta - \sec^2\theta - \cot^2\theta - \tan^2\theta - \cos^2\theta - \sin^2\theta = -3$ *(½ mark)*

$\ldots \left[\because \frac{1}{\sin\theta} = \operatorname{cosec}\theta, \frac{1}{\cos\theta} = \sec\theta, \frac{1}{\tan\theta} = \cot\theta, \right.$

$\left. \frac{1}{\cot\theta} = \tan\theta, \frac{1}{\sec\theta} = \cos\theta \text{ and } \frac{1}{\operatorname{cosec}\theta} = \sin\theta\right]$

$\therefore (\operatorname{cosec}^2\theta - \cot^2\theta) - (\cos^2\theta + \sin^2\theta) - (\sec^2\theta + \tan^2\theta) = -3$

$\therefore 1 - 1 - (\sec^2\theta + \tan^2\theta) = -3$

$\ldots \left[\begin{array}{l}\operatorname{cosec}^2\theta = 1 + \cot^2\theta,\ \operatorname{cosec}^2\theta - \cot^2\theta = 1 \\ \sin^2\theta + \cos^2\theta = 1\end{array}\right]$ *(½ mark)*

$\therefore (\sec^2\theta + \tan^2\theta) = 3$ *(½ mark)*

$\therefore 1 + \tan^2\theta + \tan^2\theta = 3 \quad \ldots [\sec^2\theta = 1 + \tan^2\theta]$ *(½ mark)*

$\therefore 2\tan^2\theta = 3 - 1$

$\therefore 2\tan^2\theta = 2$

$\therefore \tan^2\theta = 1$ *(½ mark)*

$\therefore \tan\theta = 1$ *(½ mark)*

We know that, $\tan 45° = 1$ *(½ mark)*

$\therefore \theta = 45°$ *(½ mark)*

Ans. $\theta = 45°$

(ii) Solution :

Let the radius of the spherical ball be (R).

Radius of the cylinder (r) = 12 cm.

Height of the raised water (h) = 6.75 cm *(½ mark)*

Volume of iron ball = Volume of water raised *(½ mark)*

$\therefore \frac{4}{3}\pi R^3 = \pi r^2 h$ *(½ mark)*

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Q. No. 4

$\therefore \frac{4}{3}R^3 = r^2h$ *(½ mark)*

$\therefore \frac{4}{3} \times R^3 = 12 \times 12 \times 6.75$ *(½ mark)*

$\therefore R^3 = \frac{12 \times 12 \times 6.75 \times 3}{4}$ *(½ mark)*

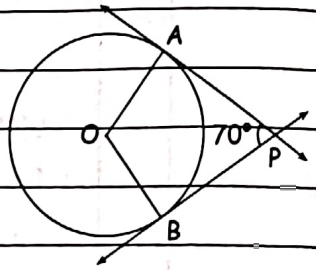
$\therefore R^3 = 729$ *(½ mark)*

$\therefore R = 9$ cm *(½ mark)*

Ans. Radius of the iron ball is 9 cm.

(iii) Solution :

Analytical figure :



$\angle OAP = \angle OBP = 90°$ ... (Tangent theorem)

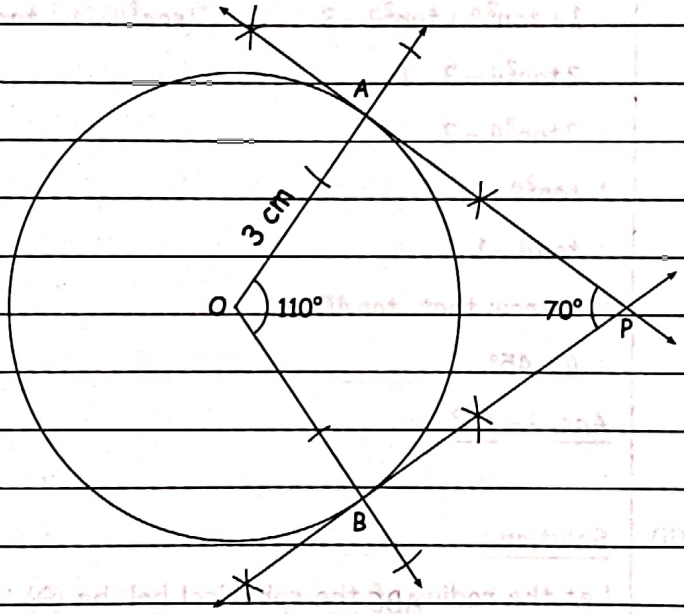
$\angle OAP + \angle OBP + \angle APB + \angle AOB = 360°$

... (Sum of all angles of a quadrilateral is 360°)

$90° + 90° + 70° + \angle AOB = 360°$

$\therefore \angle AOB = 360° - 250° \quad \therefore \angle AOB = 110°$

Ans.



[Marking scheme :

(1) For analytical figure and analysis. *(1 mark)*

(2) To draw circle of radius 3 cm. *(1 mark)*

(3) To draw $\angle AOB = 110°$. *(1 mark)*

(4) To draw tangents at A and B. *(1 mark)]*

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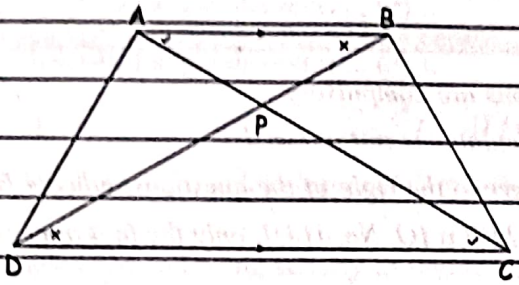
Q. No. 5

Note : In this question type, students are required to solve any 1 of 2 subquestions. However, solutions to both the subquestions are given here, for the guidance of the students.

(i) Ans.

(a)



(1 mark)

(b) ∠PAB and ∠PCD are one pair of alternate angles.

(Note : Student can even write ∠PBA and ∠PDC.) *(½ mark)*

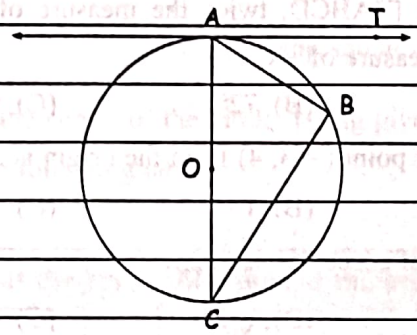
∠APB and ∠CPD are one pair of opposite angles.

(Note : Student can even write ∠BPC and ∠APD.) *(½ mark)*

(c) △APB ~ △CPD ... (AA test of similarity) *(1 mark)*

(ii) Ans.

(a)



(1 mark)

(b) ∠CAT = 90° ... (Tangent theorem) *(½ mark)*

∠ABC = 90° ... (Angle inscribed in a semicircle is a right angle)

(½ mark)

(c) ∠CAT ≅ ∠ABC ... (Both measure 90°) *(1 mark)*

N 640

Seat No. | | | | | | | |

2024 III 18 1100 – N 640 – SCIENCE AND TECHNOLOGY (72) – PART I (E)

(REVISED COURSE)

Time : 2 Hours (Pages 12) Max. Marks : 40

Note :— (*i*) ***All* questions are compulsory.**

(*ii*) **Use of a calculator is not allowed.**

(*iii*) **The numbers to the right of the questions indicate full marks.**

(*iv*) **In case of MCQs [Q. No. 1(A)] only the first attempt will be evaluated and will be given credit.**

(*v*) **Scientifically correct, labeled diagrams should be drawn wherever necessary.**

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1. (A) Write the correct alternative : **5**

(*i*) The SI unit of heat is .....

(A) Calorie

(B) Joule

(C) Kcal/kg °C

(D) Cal/g °C

(*ii*) We can see the sun even when it is little below the horizon because of .....

(A) Reflection of light

(B) Refraction of light

(C) Dispersion of light

(D) Absorption of light

(*iii*) ..... is the functional group of carboxylic acid.

(A) —COOH

(B) —CO—

(C) —CHO—

(D) —OH

(*iv*) In simple microscope ..... lens is used.

(A) Concave

(B) Plano concave

(C) Plano convex

(D) Convex

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(*v*) In ..... process a layer of molten tin is deposited on metals.

(A) Anodization

(B) Tinning

(C) Galvanizing

(D) Alloying

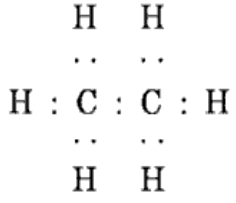
(B) Answer the following : **5**

(*i*) Write the name of the atom having the smallest size.

(*ii*) Write the molecular formula of calcium carbonate.

(*iii*) Write the use of 'Calorimeter'.

(*iv*) Identify the hydrocarbon from the given electron-dot structure :



(*v*) Match the Columns :

Column 'A'	**Column 'B'**
Refractive index	(*a*) 1.31
of water	(*b*) 1.36
	(*c*) 1.33

2. (A) **Give scientific reasons (any *two*) :** **4**

(*i*) When the gas formed on heating limestone, is passed through freshly prepared lime water, the lime water turns milky.

(*ii*) Tungsten metal is used to make a solenoid type coil in an electric bulb.

(*iii*) On exposure to air, silver articles turn blackish after some time.

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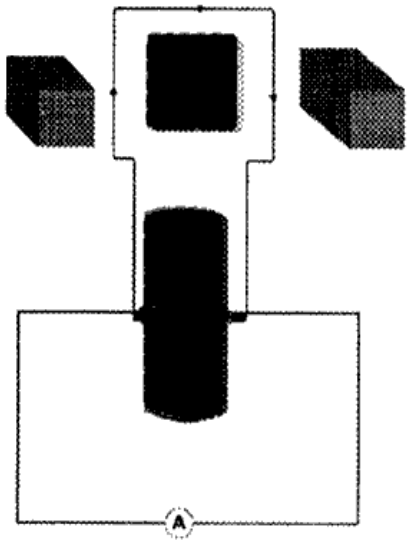
(B) **Answer the following (any *three*) :** **6**

(*i*) State Dobereiner's law of triad. Give *one* example of it.

(*ii*) Identify the figure and explain its use :



(*iii*) What is meant by satellite launch vehicle ? Name any *one* Indian satellite launch vehicle.

(*iv*) What is free fall ? When is it possible ?

(*v*) The focal length of a convex lens is 20 cm. What is its power ?

3. Answer the following (any *five*) : 15

(*i*) Select the appropriate options and complete the following paragraph :

(Metals, non-metals, metalloids, four, seven, *s*-block, *p*-block, *d*-block, *f*-block).

On the basis of electronic configuration, elements in the modern periodic table are classified into ..... blocks. Groups 1 and 2 elements are included in ..... and all these elements are metals. (except Hydrogen). Group 13 to 18 elements are included in ..... . This block contains metals, non-metals and metalloids. Group 3 to 12 elements are included in ..... and all the elements are ..... elements shown at the bottom of the periodic table i.e. Lanthanides and Actinides constitute ..... and all these elements are metals.

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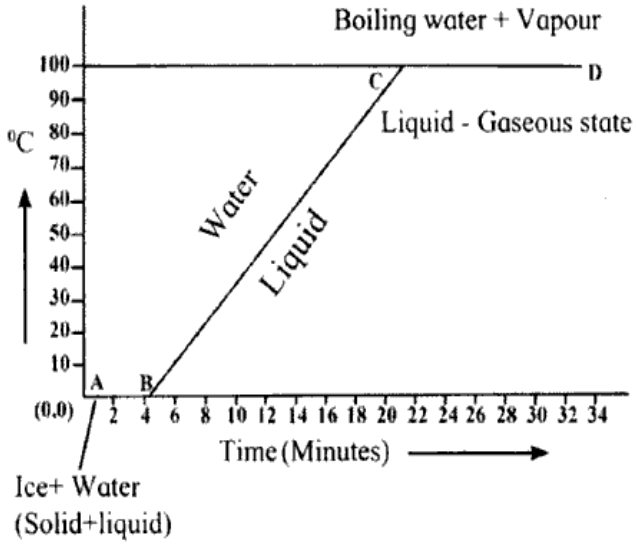
(*ii*) (*a*) What are the factors affecting the rate of chemical reaction ?

(*b*) Explain any *one* factor.

(*iii*) Observe the following graph and answer the following questions :

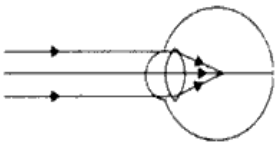
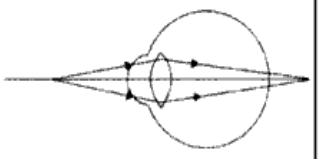


(*a*) What does the graph represent ?

(*b*) What does the line AB represent ?

(*c*) What does the line BC represent ?

(*iv*) Complete the following table by observing the given figures :

Figure → / Points ↓		
(*a*) Name of the defect	.....	.....
(*b*) Position of the image	.....	.....
(*c*) Lens used to correct the defect	.....	.....

(*v*) Write any *three* general properties of ionic compounds.

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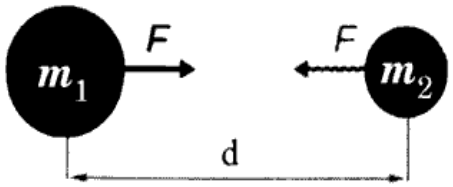
(*vi*) Observe the figure and answer the questions :



(*a*) State Newton's universal law of gravitation.

(*b*) If the distance between the two bodies is tripled, how will the gravitational force between them change ?

(*c*) What will happen to gravitational force, if mass of one of the object is doubled ?

(*vii*) The orbit of a satellite is exactly 35780 km above the earth's surface and its tangential velocity is 3.08 km/s.

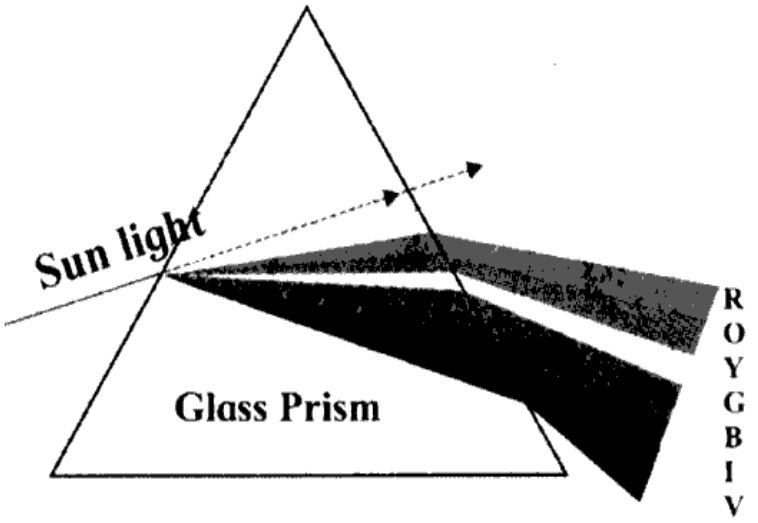
How much time the satellite will take to complete one revolution around the earth ?

(Radius of earth = 6400 km.)

(*viii*) What is a solenoid ? Draw a neat diagram and name its various components.

4. Answer the following questions (any *one*) : **5**

(*i*) Observe the given diagram and answer the questions :



(*a*) Name the process shown in the figure.

(*b*) Name the colour that deviates the most.

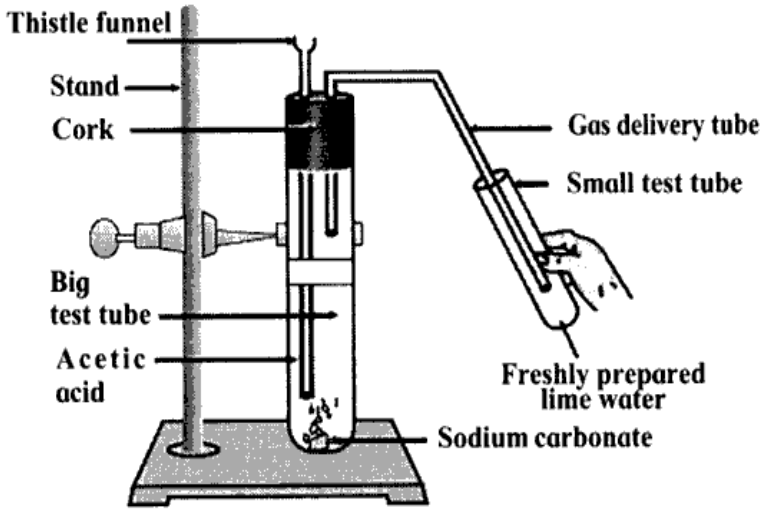
(*c*) Name the colour that deviates the least.

(*d*) Name any *one* phenomenon in the nature which is based on the above process.

(*e*) Define 'spectrum'.

P.T.O.

(*ii*) Observe the diagram given below and answer the questions :



(*a*) Name the reactants in this reaction.

(*b*) Which gas comes out as effervescence in the bigger test tube ?

(*c*) What is the colour change in the lime water ?

(*d*) In the above experiment instead of sodium carbonate which chemical can be used to get same products ?

(*e*) Write the use of acetic acid.